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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/059,422	01/31/2002	Nestor Alexander Bojarczuk JR.	YOR920010368US2	7372

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EXAMINER	
DOAN, THERESA T	
ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 10/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/059,422	BOJARCZUK ET AL.	
	Examiner	Art Unit	
	Theresa T Doan	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-27 and 56-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-27 and 56-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 74-75 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitations of "...wherein said crystalline oxide layer is **exactly** lattice-matched to silicon", as recited in claims 74-75, are not supported in the original disclosure.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 15-16, 19-20, 27, 56, 60, 62, 65, 67 and 75 are rejected under 35 U.S.C. 102(b) as being anticipated by Guenzer (5,478,653) as previously cited.

Regarding claims 15, 19-20 and 56, Guenzer teaches in figure 2 a semiconductor structure, comprising:

a silicon substrate (22,20) (column 3, lines 20-21);

a crystalline oxide (BTO) layer 12 formed over the substrate (column 2, lines 30-31); and

an epitaxial silicon layer 14 formed on the crystalline oxide layer.

Regarding claim 27, Guenzer further teaches that epitaxial silicon layer 14 can be made of either crystal silicon layer or amorphous silicon layer (column 1, lines 15-40).

Regarding the process limitations recited in claim 27 (an evaporation or chemical vapor deposition), these would not carry patentable weight in this claim drawn to a structure, because distinct structure is not necessarily produced.

Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marosi et al., 218 USPQ 289; and particularly In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a

new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that the applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

Regarding claim 16, Guenzer teaches in figure 2, a silicon oxide layer 20 formed between the substrate 22 and the crystalline oxide layer 12.

Regarding claims 60 and 62, Guenzer teaches in figure 2, wherein the crystalline oxide layer 12 is formed directly on the substrate (20,22).

Regarding claims 65 and 67, Guenzer teaches in figure 2, wherein the crystalline oxide layer 12 comprises an epitaxial oxide layer (column 2, lines 37-39).

Regarding claim 75, Guenzer teaches the crystalline oxide layer 12 is lattice-matched to silicon (column 2, lines 12-18).

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claims 15, 60, 65 and 74 are rejected under 35 U.S.C. 102(e) as being anticipated by Wilk et al. (6,248,621) as previously cited.

Regarding claim 15, Wilk et al. teach in figure 2 a semiconductor structure, comprising:

a silicon substrate 1 (column 3, lines 42-43);

a crystalline oxide layer (3,5) formed over the substrate; and

an epitaxial silicon layer 7 formed on the crystalline oxide layer.

Regarding claim 60, Wilk et al. teaches in figure 2, wherein the crystalline oxide layer 3 is formed directly on the substrate 1.

Regarding claim 65, Wilk et al. teaches in figure 2, wherein the crystalline oxide layer 5 comprises an epitaxial oxide layer (column 3, lines 44-51).

Regarding claim 74, insofar as in compliance with 35 U.S.C. 112, Wilk teaches in figure 2, wherein the crystalline oxide surface (3,5) is exactly lattice-matched to silicon (column 2, lines 16-19).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 17-18 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Setsune et al. (4,980,339) as previously cited.

Regarding claims 17-18, Guenzer teaches substantially the entire claimed structure, as applied to claims 15 above, except for the crystalline oxide layer comprises an oxide of at least one of the rare earth elements such as an oxide of yttrium.

Setsune et al. teach in figure 1 the crystalline oxide layer comprises an oxide of at least one species selected from the group consisting of Ti, Bi, Sc, Y and Lanthanide element (column 1, lines 52-57) and furthermore, for stabilized property by oxides of the rare earth elements such as an oxide of yttrium... e.g. (column 2, lines 39-41). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to substitute an oxide of yttrium for an oxide of Bi in Guenzer. Because the substitution of art recognized equivalent as suggested by Setsune et al. is within the level of ordinary skill in the art.

Regarding claim 57, Setsune et al. teach in figure 1 the substrate comprises a germanium substrate (column 2, lines 54-59).

9. Claims 68 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Yano et al. (6,096,434) of record.

Guenzer teaches substantially the entire claimed structure, as applied to claims 15 and 27 above, except for the crystalline oxide layer comprises a single-crystal oxide layer.

Yano et al. teach a $PbTiO_3$ crystalline oxide layer comprises a single-crystal oxide layer in order to adjust the tensile stress (column 5, lines 40-67 and column 6, lines 1-25). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form a single-crystal oxide layer in Guenzer's device as taught by Yano et al. to control the tensile stress.

10. Claims 71 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Ami et al. (6,610,548) of record.

Guenzer teaches substantially the entire claimed structure, as applied to claims 15 and 27 above, except for the oxide layer crystallizes to have a bixbyite structure.

Ami et al. teach an oxide layer crystallizes to have a bixbyite structure for the purpose of epitaxially growing the rare earth oxide in the orientation more reliably (column 9, lines 12-57). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form an oxide layer crystallizes to have a bixbyite structure in Guenzer's device as taught by Ami et al. for the purpose of epitaxially growing the rare earth oxide in the orientation more reliably.

11. Claims 21-22, 25-26, 61, 66 and 63-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Reisman et al. (4,891,329) as previously cited.

Regarding claims 21 and 25-26, Guenzer teaches in figure 2 a semiconductor structure, comprising:

a silicon substrate 22 (column 3, lines 20-21);

a crystalline oxide (BTO) layer 12 formed over the substrate (column 2, lines 30-31); and

an epitaxial silicon layer 14 formed on the crystalline oxide layer.

Guenzer does not teach an epitaxial germanium layer formed on the crystalline oxide layer. However, Reisman et al. teach a thin layer of epitaxial non-silicon semiconductor such as germanium (Ge), gallium arsenide (GaAs) and silicon germanium alloys that formed on a crystalline layer in order to increase using in high temperature, high power, optoelectronic and radiation sensitive (figure 1C, column 1, lines 55-61). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to substitute germanium epitaxial for silicon epitaxial in Guenzer. Because the substitution of art recognized equivalent as suggested by Reisman et al. is within the level of ordinary skill in the art.

Regarding claim 22, Guenzer teaches in figure 2 a silicon oxide layer 20 formed between the substrate 22 and the crystalline oxide layer 12.

Regarding claim 61, Guenzer teaches in figure 2, wherein the crystalline oxide layer 12 is formed directly on the substrate (20,22).

Regarding claim 66, Guenzer teaches in figure 2, wherein the crystalline oxide layer 12 comprises an epitaxial oxide layer (column 2, lines 37-39).

Regarding claims 63-64, Guenzer shows in background art, wherein the epitaxial silicon layer comprises a single-crystal epitaxial silicon layer in order to prevent any parasitic interactions with the silicon substrate (column 1, lines 15-40).

12. Claim 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Reisman et al. (4,891,329) and further in view of Yano et al. (6,096,434) of record.

Guenzer and Reisman teach substantially the entire claimed structure, as applied to claim 21 above, except for the crystalline oxide layer comprises a single-crystal oxide layer.

Yano et al. teach a $PbTiO_3$ crystalline oxide layer comprises a single-crystal oxide layer in order to adjust the tensile stress (column 5, lines 40-67 and column 6, lines 1-25). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form a single-crystal oxide layer in Guenzer's device as taught by Yano et al. to control the tensile stress.

13. Claims 23-24 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Reisman et al. (4,891,329) and further in view of Setsune et al. (4,980,339) as previously cited.

Regarding claims 23-24, Guenzer teaches substantially the entire claimed structure, as applied to claims 15, 21 above, except for the crystalline oxide layer comprises an oxide of at least one of the rare earth elements such as an oxide of yttrium.

Setsune et al. teach in figure 1 the crystalline oxide layer comprises an oxide of at least one species selected from the group consisting of Ti, Bi, Sc, Y and Lanthanide element (column 1, lines 52-57) and further, for stabilized property by oxides of the rare earth elements such as an oxide of yttrium... e.g. (column 2, lines 39-41). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to substitute an oxide of yttrium for an oxide of Bi in Guenzer. Because the substitution of art recognized equivalent as suggested by Setsune et al. is within the level of ordinary skill in the art.

Regarding claim 59, Setsune et al. teach in figure 1 the substrate comprises a germanium substrate (column 2, lines 54-59).

14. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Guenzer (5,478,653) in view of Reisman et al. (4,891,329) and further in view of Ami et al. (6,610,548) of record.

Guenzer and Reisman et al. teach substantially the entire claimed structure, as applied to claim 21 above, except for the oxide layer crystallizes to have a bixbyite structure.

Ami et al. teach an oxide layer crystallizes to have a bixbyite structure for the purpose of epitaxially growing the rare earth oxide in the orientation more reliably (column 9, lines 12-57). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form an oxide layer crystallizes to have a bixbyite structure in Guenzer's device as taught by Ami et al. for the purpose of epitaxially growing the rare earth oxide in the orientation more reliably.

Response to Arguments

15. Applicant argues that Guenzer fails to teach or suggest the crystalline oxide layer is formed directly on the substrate. The argument is not persuasive because the limitation of "the crystalline oxide layer is formed directly on the substrate" is not recited in the rejected of claims 15, 21 and 27. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). In this case, the invention as independent claimed is not overcome the references of Guenzer and Wilk. However, Guenzer and Wilk et al. also teach the crystalline oxide layer is formed directly on the substrate as claimed in the new dependent claims (see Office Action above).

16. Applicant argues that Wilk fails to teach or suggest the crystalline oxide layer is **exactly** lattice-matched to silicon. The argument is not persuasive because the

limitations of "...wherein said crystalline oxide layer is **exactly** lattice-matched to silicon", as recited in claims 74-75, are not supported in the original disclosure. However, Guenzer and Wilk et al. also teach this feature (See Office Action above).

17. Applicant argues that the structure of Guenzer fails to teach or suggest the epitaxial silicon layer comprises a single-crystal epitaxial silicon layer. The argument is not persuasive because the limitation of "wherein the epitaxial silicon layer comprises a single-crystal epitaxial silicon layer" is not recited in the rejected of claims 15, 21 and 27. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). In this case, the invention as independent claimed is not overcome the references of Guenzer and Wilk. Furthermore, Guenzer shows in background art, wherein the epitaxial silicon layer comprises a single-crystal epitaxial silicon layer in order to prevent any parasitic interactions with the silicon substrate (column 1, lines 15-40).

The rest of applicant's arguments, addressed to the amended claims are considered in the rejections shown above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Theresa T Doan whose telephone number is (703) 305-2366. The examiner can normally be reached on Monday to Thursday from 8:00AM - 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WAEL FAHMY can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TD
October 10, 2003.

PHAT X. CAO
PRIMARY EXAMINER